Ronald C. Larson: This is an interview made at Albuquerque, New Mexico on March 20, 1979. This interview is part of a joint historical research project on the history of Western Forest Entomology conducted by the United States Department of Agriculture Forest Service and the Forest History Society of Santa Cruz, California. The interviewer is Ronald C. Larson All ownership of this tape, recording, and copies thereof results in the public domain.

Good morning Mr. Massey. Where and when were you born?

Calvin Massey: I was born in Denver, Colorado, November 20, 1914.

Larson: Could you tell me about your early childhood and about the years leading up to the time you went to college? What sort of things made you interested in entomology?

Massey: Well, probably my reason for going into entomology was more accidental than anything else. My father was a businessman in Denver and during the Depression, like many other people, he went bankrupt. We moved to a small truck farm in Wheatridge, Colorado, which is a suburb of Denver. My mother was quite interested in home demonstration which had to do with County Extension Services. The County Extension Agent was an entomologist. I had no idea of even going to college but I became interested in insects at that time. While I was in high school I suffered a broken neck in playing high school football, and because of it the State Rehabilitation Service gave me a scholarship to go to Colorado A & M.

Larson: Was that an open scholarship? Did you have your choice of what area you wanted to go into?

Massey: It was an open scholarship and I could do anything I wanted to Fort Collins was rather close to home, sixty miles, and was one considerations for selection. Another was that I had become interested in entomology due to the County Extension Agent

and Colorado A & M then was the only place in the State that taught entomology as such.

Larson: Could you describe the program there at Fort Collins?

Massey: They had an excellent program in entomology. There were not many students, when I graduated there were only three entomologists in the class. When I was going to school at Colorado A & M, which probably has six or seven thousand students now and is called Colorado State University, there were only eleven hundred in the entire school. They had some very well known entomologists. There was Miss Palmer who was probably one of the most, until she died--I think she died just a year or two ago--prominent person in the field of Aphids in the United States. They also had Dr. List who was an excellent entomologist.

Larson: Do you know how to spell that List?

Massey: L-I-S-T. Then, there was John Hoerner, who was probably more interested in students than any man that I have known, also an entomologist. He was probably one of the best professors that I ever studied under.

Larson: Did any of these professors have experience in forest entomology?

Massey: None.

Larson: So, it was agriculturally oriented.

Massey: It was agriculturally oriented, at that time, I was looking for summer work, and they had the forest insect laboratory which was operating cooperation with the Forest Experiment Station at the college or the university, whichever you want to call it. It is a university now and back then it was a college. They had summer work available in forest entomology and I applied and got the job. I have worked in forest entomology ever since, except during the war years when there was no work in any of the laboratories.

Larson: When you first went to Fort Collins as a temporary worker, who else was already there? Were there any entomologists there?

Massey: Yes. Jim Beal was in charge of the laboratory. A fellow by the name of Lynn Baumhaufer, a fellow by the name of DeLeon, and Noel Wygant.

Larson: We are going to be interviewing Noel Wygant on this series, but could you briefly describe Beal, and DeLeon?

Massey: I would imagine that Jim Beal was more responsible than anyone else for getting me to stay in the field of forest entomology. He was quite interested in the field but not to the extent that he...I don't know what to say, but he was inspiring. Both Baumhaufer and DeLeon were dissimilar in nature. Baumhaufer was one of the quietest men that I have ever known, but very capable. DeLeon was a fire-cracker. In other words, he was quite explosive on occasion. In fact, he was one of the most intense entomologists that I have known. I am quite sure that he even took entomology to bed with him because he was that...

Larson: (laughter) Dedicated.

Massey: ...dedicated to the field.

Larson: What did you do working temporarily there?

Massey: The first summer that I worked I worked on Black Hills Beetle, Dendroctonos Ponderosae. They had quite an infestation in the Denver Mountain Parks. The second year I worked on both the Pandora Moth and on the Shelter Belt Project.

Larson: Why don't we deal with each of these in turn?

Massey: All right.

Larson: The first work you did with the Black Hills Beetle, could you describe briefly what you actually did?

Massey: They were controlling the Black Hills Beetle at that time. In other words, they were cutting and buring, which was, at that time, in 1936 or 1937, the only known method of control. Well, after they would cut them, to determine what the populations were, we would take six by six inch samples and would count all the larvae in the sample. What they did with all that material I don't know, but eventually it was used in population studies. I don't think that it was published persay, but it was data that they used in life history studies.

Larson: The cut, slash and burn method was really an after-the-fact control, wasn't it?

Massey: That's right.

Larson: Therefore, it probably had very little to do with really limiting any sort of infestation, it seems. It might reduce it once there was an epidemic, but there was no sort of preventative nature to it, was there?

Massey: No, and as far as that is concerned, I don't think that they have any preventative controls for Bark Beetles. At least I don't know of any. The methods have changed but the end result is always the same.

Larson: So, it is always sort of a crisis oriented science, in a way.

Massey: That's right. Oh, we could probably get into things if we go on with this type of questioning, which you might want to get into later, in studies that we made on and Spruce Beetle.

Larson: Okay. Why don't we wait then until we get to that.
Can you describe your work on the Pandora Moth epidemic?

Massey: The Pandora Moth outbreak was on the Arapaho National Forest and was confined to not much more than a section or so. The history of the Pandora Moth was that epidemics would occur and then they die off. Most of the Pandora Moth studies had been made in the Pacific Northwest on Ponderosa Pine. I am not sure of this now, but I think it was Oregon. The one that occurred in Colorado was the only one known to have occurred on lodgepole pine and the first one that they had picked up in a long time. Incidently since the interview they have discovered an extensive infestation of the Pandora moth on the north rim of Grand Canyon where it is extensively infesting ponderosa pine. To my knowledge this is the only infestation of any consequence since the Colorado outbreak. It covered a small area and they knew very little about its life history. So, what we were doing in general was studying the life history of the Pandora Moth in Colorado on lodgepole pine. To this day, I don't think that the Pandora Moth has been a serious pest at any time, except in local areas in local outbreaks. It was more of an aesthetic interest because the insect was rare.

Larson: But you didn't know it at that time.

Massey: We didn't know how far it would go at that time.

Larson: Because it was still spreading.

Massey: It was spreading, Incidentally, in the insect we found virus, which was later used in control of the Tussock Moth and Tent Caterpillar, I am quite sure the Polyhedral virus of the Pandora Moth is different from either one of those. It is an insect that pupates in the ground. We found threr was a remendous amount of mortality of the larvae when they left the trees and crawled over the hot ground trying to find a place to pupate.

Larson: So, did you try to determine what would cause an outbreak?

Massey: I think the thing died down within a year or two and we never could.

Larson: If they are so susceptible to heat and everything, it seems they most have a rather ideal situation in order to survive.

Massey: That's right. We had the same situation in New Mexico with an insect called the New Mexico Firlooper, which attacks White Fir, Douglas Fir and White Pine. We found an infestation of it on the Lincoln National Forest, It lasted one year and it was killed by a fungus disease and by turkeys.

Larson: (laughter) In the last few years another infestation was found on the same forest with the same longevity.

Massey: They pupate in the ground, To me, the lepidopterous insects that pupate in the ground are much more susceptible to natural control factors than those which pupate on the bark or in the tree itself, We weren't able to do any research on the New Mexicanfirlooper in fact, Bob Furmiss when he finished his Western Forest Insect book, wrote a note on the front of the book sent to me saying that he was sorry that we could not publish any more on the insect. He was tremendously interested in the insect because of its rarity and because of its ability to strip great numbers of trees Fir and White Pine and then disappear, When I say disappear, I mean disappear, for the next several years you could find nothing.

Larson: So, they must have some kind of survival method. I see the intellectural interest in that.

Massey: I am sure they have.

Larson: I would like to hear about your work on the Shelter Belt which was just a little bit different then.

Massey: It was right after the Dust Bowl in 1936 or 1937, I can remember that it was towards the end of the Dust Bowl disaster, I can remember that in Fort Collins at the time, we would go to school and by God, you couldn't see the sun for weeks on end because of the dust. People decided, and rightly so, that the answer was shelter belts, and I think that the shelter belts saved large areas from erosion in parts of Oklahoma, Nebraska, and Kansas. We were working with Cottonwood Borer, the insect would attack newly planted trees and chew off the bottoms and kill them. They would also lay eggs, the developing larvae would girdle the tree and it would die. They would come from old Cottonwood trees that were on the river bottom.

Larson: What kind of trees were these in the shelter belts?

Massey: They were Cottonwood that they were planting then. I don't think they knew at that time what in the hell they were going to use as shelter belts. They were using Cottonwood as one of the trees because it was native to the area.

Larson: That was the problem, wasn't it?

Massey: That's right.

Larson: They probably should have brought something from the outside.

Massey: That's right, and I think eventually they did; they used Elm and some of the other trees-- Probably Chinese Elm or Siberian Elm; I don't know which one. They used them as windbreaks. As I said, Noel Wygant knows much more about this than I do. He followed it for several years after I quit working on it.

Larson: This was a cooperative venture then?

Massey: This was all done in the Bureau of Entomology. It had nothing to do with the Forest Service.

Larson: The Forest Service administrated the shelter belts, didn't they?

Massey: I don't know at that time whether they did or not, or whether it was the Bureau of Agricultural Engineering and Reclamantion. I really can't tell you. It was in the Department of Agriculture. I know that.

Larson: But you were still operating within the Bureau of Entomology?

Massey: Within the Bureau of Entomology. I was looking at a program on cable television the other night which was entitled "Catastrophes in the Shelter Belts." It was a catastrophe because it chased all those people from their ranches and farms at that time. They were noting that people never seem to learn and that many of those shelter belts had been cut down after they had been grown. In other words, they cut down the trees because they took too much of the land they wanted for planting.

Larson: After your temporary work then at Fort Colins, you went back to graduate school.

Massey: I went to graduate school at Duke University.

Larson: What year was this?

Massey: I started in 1939.

Larson: What year did you graduate from high school?

Massey: I graduated from high school in 1935.

Larson: Okay. Can you describe your courses in graduate school?

Massey: I went to Duke University and since they had no Masters' Degree except in Forestry, in the subjects that I was interested in, I took a Master's Degree in Arts with a major in Forestry. I worked on the Pandora Moth.

Larson: So, you still stayed within Entomology?

Massey: I stayed within entomology, and then I took my Doctors' Degree and worked on Bark Beetles of North Carolina.

Larson: Going back a little bit, did you have sufficient instruction in entomology?

Massey: Oh yes. Jim Beal was there at that time and was head of the department. Again, most of the entomology that I needed I had taken at Colorado State. What I went to Duke was to gain more knowledge in tree physiology, timber management, and biological control. I took a minor in biological control. They had a fellow by the name of Pierce who was preeminent in the field of biological control, at the time.

Larson: Why did you choose Duke?

Massey: Mostly because they gave me a scholarship.

Larson: Oh (laughter), that's a good reason.

Massey: (laughter)

Larson: And Jim Beal, you had already known him?

Massey: I had known him and he asked me if I wanted to come, that they were giving scholarships and I could get a scholarship if I wanted. The first year I got a scholarship for my Master's Degree. My last three years I had a Fellowship.

Larson: Can you describe your thesis? Did you do a thesis for your M.A.?

Massey: It was entirely on the life history of the Pandora Moth.

Larson: Did you come up with any new findings?

Massey: No, no, it was a compilation of the research data that we had taken in the field on the Arapaho National Forest.

Larson: It is probably still pretty much a nonunderstood subject, any way.

Massey: That's right. Basically, we knew the life history and there was not much new information.

Larson: But, you were bringing all the data in and putting it in one single document.

Massey: That's right.

Larson: Could you describe your dissertation? Your PhD dissertation?

Massey: It was a taxonomic subject. I have always been interested in taxonomy, we collected all the Bark Beetles throught the state and determined the life history as we knew it--the hosts and their habits--and wrote taxonomic descriptions of the Bark Beetles that we had collected in the state.

Larson: Are you somewhat unique then, among the entomologists at that time, and with your knowledge of taxonomy?

Massey: I think so. It was unique in that I had studied probably more Bark Beetles and a variable number than anyone else in the Bureau at that time. I can't think of anyone that had done more work on Bark Beetles than I had.

Larson: That is a very important thing because the Bark Beetle seems to be a very major pest..

Massey: They probably cause more tree mortality in the United States than any other one group of insects. They cause more mortality than fire, but still get less attention than fire prevention or other insects for that matter.

Larson: I know it. I wonder why?

Massey: I don't know.

Larson: Maybe it was because you were a bureau that was separate from a larger organization such as the Forest Service, that had a large administration behind it that could emphasize fire, since that was within their jurisdiction.

Massey: That's right. After we went into the Forest Service they were not any more interested in Bark Beetle research than the bureau had been, I am quite sure that every dollar they had spent on Bark Beetle research, that the Forest Service spent a hundred on fire research.

Larson: Perhaps it would be better to get into this at the point when the bureau is absorbed by the Forest Service. Maybe they won't even talk about these issues. It might make more sense.

Massey: All right.

Larson: What year did you get your PhD?

Massey: I got my PhD in 1943.

Larson: And then what did you do?

Massey: I went to work for the Pullman Company.

Larson: The Pullman Compnay?

Massey: Because there were no jobs available.

Larson: Yes.

Massey: I had a wife and a child and I had to work. I worked for the Pullman Company about three months and then went to work for the County Extension Agent. This was during the war.

Larson: Was this back in Colorado?

Massey: This was in Colorado and it was hiring mostly winos from Larimer Street, and Arapaho Street in Denver, for the County Agent. They would

work on these truck farms around Denver. I worked for the County Agent for about six months and then I went to work for the Forest Service on a job marking trees for timber sale.

Larson: Is this in 1944 then?

Massey: Yes. That was, again, on the Roosevelt National Forest. I think it was the spring of the following year that the Bureau of Entomology and Forest Insect Research got some money. They had a Spruce Bud Worm outbreak in the Northeast.

Larson: You mean?

Massey: In the Northeastern United States.

Larson: Okay.

Massey: They had a Spruce Beetle outbreak in Colorado, and Craighead said, "well, we have two positions..."

Larson: Was this Frank Craighead?

Massey: Frank Craighead said "well, we have two positions over here. If you want to go to the Northeast, I can promise you a permanent job. If you want to work on the Engleman Spruce Beetle, I can't promise you over the summer or into the winter because we just haven't got the money," He said "take what you want." Well, I had worked with Bark Beetles and I didn't feel at home with Lepidopteroos instects at that time. So, even though it was kind of chancy, I took the work with the Spruce Beetle. Noel Wygant was in charge of what was a one manylaboratory at that time. Well, I won't say one man because Dwight Hester was running surveys.

Larson: You mentioned Frank Craighead. Had you known him long?

Massey: No. I knew Craighead from my temporary days, although I would say I have known him from 1936 until 1944. In fact, while I was going to Duke I went up to Washington to talk to him about a job when I got out of school. I had met him maybe four or five times during that period. A good deal of the time we were studying Black Hills Beetles on Elk Mountain in the Southwestern part of Wyoming. We were running caging studies on the Black Hills Beetle.

Larson: Meaning what?

Massey: Meaning that we would start at about seven thousand feet and cage a certain number of trees clear to the timber line whichwas ten to eleven thousand feet and make daily collections. In other words, what we had to do was climb from seven thousand feet to ten thousand feet every day and remove all beetles that emerged. In an effort to determine time of emergence at the lower elevations as compared to the higher elevations.

Larson: And a cage would prevent any movement of the insects away from the tree?

Massey: It was the method that has been used in the Forest Insect Research since I can remember. In other words, a strip of bark probably a foot to eighteen inches wide, was covered with screen and was funneled down into a jar with water in it. Everything that emerged in that screen was funneled into the water and we would take those collections and make counts of time of emergence.

Larson: What did you find in comparing the emergence at the various levels?

Massey: I can't recall now, but there was quite a difference. I am quite sure that those at the lower elevations would have emerged faster than those...I mean, not faster but earlier than those at the higher elevations.

Larson: Do you remember whether there were, or that you found that the population was also greater at the lower elevations?

Massey: I can't recall because it has been so long and, as I said, at that time I was just a temporary.

Larson: It was all new to you.

Massey: It was all new to me.

Larson: Frank Craighead was a very innovative sort of man in that it seems like, from what we found, that he saw the insect problem as being ecologically based, and therefore, he saw that real insect control had to be a cooperative effort amongst many different branches of Forestry, where before, it seems that insects were looked at as a problem in themselves. Do you remember any part of this?

Massey: Well, vaguely. I am quite sure that he thought...

Craighead was quite broad in his views as to forest insects, but his first love was Cerambycids, another name for Longhorn Beetles. He probably wrote the definitive work on Longhorn Beetles while he work working in Canada. Let's also say that he was a scientist. He was one of the few people that was in the Bureau at that time, in an administrative job--I won't say few people, but one of the people that was in administration--whose first love was science. I have nothing but great respect for Craighead.

Larson: Some people in the Bureau were rather upset with him when he did come out with this sort of view of the insect problems, and I just wondered if you were aware of that?

Massey: Well, I don't know why they should have been. I know we were never upset; the people who were based in Colorado, which was the Rocky Mountain region. I don't know why the people in California should have been because I think probably the most valuable work in forest insects that was done in California was Keenes work with silvicultural control of insects, in other words, tree classification.

Larson: Which is an ecologically oriented thing.

Massey: That's right, it was an ecologically oriented theory. As far as eastern people were concerned, I don't know. I have never worked in the East except, well, we can get into that later, in my work with Nematotes, where I did collecting. I think that his theories were basically sound.

Larson: I think they have been proven sound, through time, anyway, but at the time it seems he was susceptible to the charge of perhaps deemphasizing the importance of the Bureau of Entomology because his approach brought in more cooperation with the Forest Service and other groups. Well, we don't have to go any farther than this. Could you talk about Noel Wygant and just a brief thing about your experience working with him?

Massey: I had a lot of respect for Noel. In fact, I worked with Noel my entire career. I worked under him for, well, basically until he retired. Noel was quite intense in his dedication to the field to the point that at times I think it affected his health, as far as his nerves were concerned. He let it get him down to that affect. I think it was much worse after we went to work for the Forest Service than while we were in the Bureau. I enjoyed working with Noel. Of course, we had our spats like everyone does.

Larson: Sure. Well, you worked then in Fort Collins for several years, from 1944 until 1955, right?

Massey: That's right.

Larson: Could you go through then, your experiences through that time and I will only interrupt for some sort of expansion?

Massey: From 1944 until...?

Larson: Yes. from the time vou finished vour...

Massey: While I was at Fort Collins?

Larson: Yes.

Massey: Most of my work while I was at Fort Collins was on basic research with the Engelmann Spruce Beetle. The resarch was started on the White River National Forest and most of our work was done on the White River National Forest in the early years. The beetle, unless you could have seen it, you cannot realize what it had done. It had wiped out nearly the entire forest; I mean, the Spruce stands on the White River Plateau. Nobody knew a darn thing about the Engelmann Spruce Beetle. Our initial studies were to determine the life history of the insect. Initially I was working by myself and then George Strobel was assigned to the study from the Pacific Southwest. The infestations of the Spruce Beelte were on the White River Plateau and on the Grand Mesa, which is out of Grand Junction. As I said, first we had to determine its life history. We went to the caging studies, and to plot studies. In other words, we would mark out a plot to try to determine time of attack as compared to the time of emergence. The first year we were stymied because they weren't attacking the year that they emerged. This was the first, and it is, as far as I know, the only Bark Beetle that has a two year life cycle. In other words, it has to go through one winter as an adult before it is able to attack. It hibernates in the ground, not actually in the soil but under the bark beneath the soil, in the roots, and maybe up to three or four feet on the trunk. In other words, it was a protective device that the beetle was using to survive the winter. It would go down to the base and the snow would cover it and they would be protected from natural enemies as much as they could be, and then they would emerge the following spring and attack, but we didn't know this.

Larson: How do they attack?

Massey: Like all other Bark Beetles, they built up to such tremendous populations that there was no selection under epidemic condidtions.

Larson: They would go after all trees?

Massey: All trees. There was no selection. Then the following year we found out what was happening, and that they were hibernating in the base of the tree.

Larson: As adults?

Massey: As adults. The funny thing about it is under endemic conditions they are always there and they take the more weakened and the older trees, the less virgorously growing trees. That was the way they survived in nature. What had happended was that they had had tremendous windfall on the White River Plateau and on the Grand Mesa and the beetles built up such tremendous populations that when they came out of those trees they attacked all or most available trees.

Larson: Yes. They would take all trees.

Massey: They took all trees. It took us about four years to determine the life history and during that time, we were studying methods of control we were using orthodocholorbenzene and we were using ethglene dibromide, we were using emulsions, we were using reverse emulsions, and oil solutions with diesel oil, and we tried DDT.

Larson: Did you spray them from the ground?

Massey: Ground sprays, yes. I would say...now, this was still while we were in the Bureau of Entomology and I would say that the control methods that we developed at that time probably saved millions and millions of dollars in timber value. Ethglene dibromide was finally used as a control method. It was mixed with fuel oil or applied as an emulsion. In other words, water was plentiful in the mountains and the emulsions were, within a percent or two, just as effective as the oil solutions.

Larson: Why was it chosen over the other?

Massey: Ethglene dibromide?

Larson: Yes.

Massey: I think when we determined we were getting five to ten percent better control with Thglene dibromide than we were when we used orthodochlorobenzene.

Larson: And DDT wasn't inspected?

Massey: DDT was not as effective as such. When DDT was dissolved in oil and oil alone was used, the oil alone was just as effective as the DDT in oil. DDT as an emulsion was quite effective in keeping the beetles away from trees. In other words, if you wanted to protect the trees and you used DDT or benzene hexachloride, you could use emulsions of either, and protect trees that were of particular aesthetic value, in other words, along roadways, in parks, around campgrounds, and it was quite effective. We could treat a tree from the base to as high as we could reach which was maybe thirty or forty feet with the equipment available at that time, and the tops would be killed by Engelmann Spruce Beetles and the rest of it would be green.

Larson: Is this because you had to penetrate the bark? Is that why these other forms were not as effective?

Massey: That's right. You had to have something to carry the insecticide into the bark, Engelmann Spruce Beetle larvae feed within the bark, not between the wood and the bark like the Black Hills Beetle which feeds between the wood and the bark. The bark was so thick on spruce that the larvae themselves would feed right in the cambium, and if we could carry the insecticide into the cambium, then we could kill it. We had trouble killing the beetles with heat. In this method trees would be lined in a north south direction and turned periodically. The sun would be more or less effective depending on bark thickness.

Larson: They were well insulated then.

Massey: They were well insulated. We could kikk them in slabs this way but not in logs...

Larson: The sun just did not produce enough heat for a long enough time.

Massey: That's right.

Larson: At what point did you witch over to spraying and start to use that as a main system of control?

Massey: Oh, I think it was immediately following the time that we had determined the life history. That's another thing. You were talking about

Craighead's cooperation with the Forest Service. He was also quite cooperative with other divisions in the Bureau of Entomology. We had a fellow by the name of Chisholm who came out and helped us develop control methods for the Spruce Beetle to determine dosages and rates of application.

Larson: But before that, the main method was still cut and burn?

Massey: Yes, they would cut and burn and use orthodichlorobenzene and oil. I think the first time that ethglene Dibromide was used it was on the Engelmann Spruce Beetle.

Larson: So, while you were actually working as an entomologist, you saw and experienced the beginnings of using insecticides and chemicals.

Massey: That's right, the chemical control of Bark Beetles.

Larson: And it was rather effective?

Massey: It was rather effective if anything can be effective.

Larson: How is this for a question: Is anything effective?

Massey: I would say that it is effective in holding down infestation. I won't say controlled because they are controlled but not eliminated.

Larson: So, a percentage always survive?

Massey: There is a percent that always survives. The Bureau never had enough money to do all the research neccessary. I think that this is one of the reasons that the Forest Service was able to take over forest insect research and with the promise that we could get more money for research. We had always gone at the study of Bark Beetles under a crisis situation. We have never studied Bark Beetles under endemic conditions. In other words, when they should be studied. We cannot follow the build-up of epidemics from endemic conditions, and until we are able to follow the build-up of epidemics from endemic status, we are never going to be able to do what we should do.

Larson: Well, you had a rather small staff too.

Massey: That's right.

Larson: How many people were in the West?

Massey: Well, I've mentioned those three. During the war Bob Furnis came down and was in charge of the Rocky

Mountain area. I think Bob was only in charge of the laboratory for three or four months: He would be able to tell you the exact dates because this was while I was going to school. Noel Wygant was in the Pacific Southwest at California laboratory at Berkeley as they had discontinued the research in the Rocky Mountain region at that time except for a man as a go-between with the Forest Service and the Bureau of Entomology in Washington, who was Dwight Hester. They then went Noel back and this was at about the time of the Engelmann Spruce Beetle outbreak. Noel and I were the only staff. It was a two man laboratory for years.

Larson: It covered how many miles?

Massey: The whole Rocky Mountain region from the Mexican border to the Canadian border, North Dakota, and from Nevada throughout the Shelter Belts.

Larson: And so, there was no conceivable way that you could do anything but deal with crises.

Massey: That's right, that's right. And then they sent, as I said, George Strubel over to help with the life history studies on the Spruce Beetle.

Larson: How long did your work go on with the Engelmann Spruce Beetle?

Massey: It is still going on, but the basic work on the Engelmann Spruce Beetle was from 1944-55. I was then transferred to Albuquerque taking over for Jack Bongberg who had been transferred to Washington.

Larson: So then, those years from 1944 until 1955 when you left Fort Collins, Engelmann Spruce Beetles was the main topic.

Massey: That's right, except for a period of one or two summers as I recall. They had a big outbreak of the Black Hills Beetle in South Dakota and we worked on the control of that. Now, that beetle was controlled while we were starting to develop ethglene dibromide, we were still using orthodichlorobenzine there.

Larson: But you did bring them under control?

Massey: We were able to bring them under control. That's right.

Larson: How were you ever to determine whether you had actually brought them under control or if mother nature did it?

Massey: That's another thing. I don't think that there has been any actual data that could prove...

Larson: One way or the other.

Massey: ...one way or the other, except that we know that after treatment, populations were depleted. We like to think that it was our efforts that brought the insect under control. If it was not our efforts, then we wasted a hell of a lot of time and did a hell of a lot of work for nothing.

Larson: Yes. Well, hopefully when this history is completed, whenever that will be, perhaps we will be able to see that there is some correlation, or not, between preventative works and a decrease in population, as opposed to any sort of natural control.

Massey: I think that, without a doubt, that we could bring epidemics under control. What I mean by that is to a place where we can manage the infestations.

Larson: How long did the Black Hills Beetle outbreak continue at that time?

Massey: In the Black Hills?

Larson: Yes.

Massey: Oh, I would say for no more than a couple of years.

Larson: So, that is pretty short, historically.

Massey: That's right.

Larson: The earlier one was a huge infestation.

Massey: That's right.

Larson: So, that would tend to indciate that your methods were effective.

Massey: That's right.

Larson: Through those years of work on the Engelmann Spruce Beetle, you undoubtedly developed some sort of expertise on that beetle. Could you describe, in a little more detail, exactly what type of research you did, and the historical stages of that research?

Massey: The first work that we had done, as I said before, was to determine the life history of the beetle,

This took us three or four years to completely determine the life history and during that time, we were trying to control it too, and developing methods of control we used, as I said, ethglene dibromide, we used DDT, we used benzenehexachlona. We used anything we could get our hands on. We were also trying to determine the effect of cold temperatures on the Bark Beetle. In other words, it is a Bark Beetle that occurs only at higher elevations, and by that I mean it occurred in Colorado, at least, between nine and, let's say, eleven thousand feet, in which temperatures become quite...

Larson: Cold.

Massey: Cold. One aspect of the study was to determine how cold the temperatures did get in those areas. During 1946, or 1947, within that time span, we set out a series of maximum and minimum therometers over a seven mile strip at various intervals, and we would read those thermometers once a month. That work was done by Tom Terrell and myself. Once a month, from December until May, we would run this thermometer line, as we called it, of about nineteen miles, and take down the temperatures on the various thermometers throughout that strip. We did this for two years, as I recall.

Larson: Would you walk this line?

Massey: Yes with snowshoes and skiis.

Larson: How much would you have to cover in a single day?

Massey: We would have to cover the whole seven miles in one day.

Larson: On snowshoes and skiis.

Massey: On snowshoes and skiis. We camped on top overnite in an old cabin and we would start out early the next day and then get back that night. It was probably the most physically exhausting work that I had ever done in my life. Even getting to the line was so physically exhausting that we would take two or three steps and then rest, two or three steps and rest. As I told you yesterday, we would take a bottle of wine with us and a bunch of hot dogs to keep up our energy. It didn't seem that we ever got used to it. In other words, one month was as bad as the next month. During the spring months, April and May, we ran the lines to detect any sudden change in temperature. Physically they were as bad as the winter months because we would drive as far as we could and then we would have to wait until the ground froze. We would have to get out early in the morning. Tom Terrell

still talks about listening to the Indianapolis Race in an old cabin that we were stuck in. We weren't snowed in, we just could not get out until the ground froze.

Larson: Where was the cabin?

Massey: It was in the woods, and I asked Tom in a recent note, as to its location and ownership. I couldn't remember whether it was an old ranger station or some old cabin that somebody had built that we just stayed in because we couldn't find any other place.

Larson: I mean, where was it geographically?

Massey: It was, oh, probably half way up on the White River Plateau.

Larson: So, it was quite an adventure.

Massey: It was quite an adventure.

Larson: What did you find in terms of temperatures? How did that affect the research you were doing on the beetles?

Massey: Wygant, at that time, had done considerable work with--he will be able to tell you more about this than I can now--the affects of cold temperatures on the Black Hills Beetle, and he was doing the work on the Engelmann Spruce Beetle. I don't recall really what the temperatures were, but it is written up. All the work has been published. I am quite sure that work has been published in the paper that Wygant and I had done on the biology of the Spruce Beetle in Colorado. As I recall, temperatures of thirty to forty below were necessary to kill the beetles. Adults are more susceptible than larvae, and the adults were well protected by the snow cover because they were in the base of the tree. I think someone found, during this time or after this study, that the larvae have a chemical that is closely related to anti-freeze that we have in cars.

Larson: And the larvae stage really was existent during warmer months anyway, right?

Massey: Well, they have lived over winter,..because of the generations.,.in other words.,.

Larson: Why don't you go through briefly the actual life cycle?

Massey: Trees are attacked in June and July and larvae develop to adulthood by fall, they crawl down to the base. They pass one winter as larvae and the next year they crawl down to the base.

Larson: The next fall?

Massey: The next spring. Not spring, but June or July.

Larson: Okay. I see.

Massey: They over winter, in the base of the tree, and then the next year they attack. The broods are so intermixed that you always have larvae in trees. In other words, it is not a cut and dried thing.

Larson: So, when one generaton's adults are in the tree, then the follow generation's larvae are also in different trees.

Massey: That's right. In other words, the generations are mixed up. There is no such a thing as one generation developing each two years, this may be true in individual trees but not infestion wise.

Larson: One group to one cycle. Yes, which makes it hard on a tree.

Massey: Yes, that's right.

Larson: I was going to ask how you choose treatment, at what stage you chose to treat, but I guess it wouldn't matter because you would try to get all stages.

Massey: That's right. What we had to do was to treat both the larva and the adult stages. In other words, with the Black Hills Beetle you could cut the tree and treat it with the insecticide--and you wouldn't have to pay any attention to the stump, but with the Spruce Beetle all the stumps had to be well treated. In fact, they had to dig away the duff from around the base to make sure that we were getting it all.

Larson: And all stages were well protected.

Massey: All stages, yes.

Larson: I see the problem.

Massey: During this period, Wygant, I think, was looking at some beetles and he said, "you know, these beetles

are infected with worms." He said "we ought to see what the hell they're doing to them."

Larson: When was this?

Massey: This was, I would say, around 1950. He said "we ought to see what affect they are having on the beetle." It was a question whether he was going to do it or whether I would do it. He said, "well, I am too damned busy" and said "why don't you do it?" From that time on I became involved with nematode parasites of Bark Beetles. It started out with the nematode parasites of the Engelmann Spruce Beetle and it was expanded. In other words, what we were trying to do was determine if all Bark Beetles were infested with nematodes; I mean, all species of Bark Beetles.

Larson: How did you go about that type of research? Was it mostely through the microscope?

Massey: It was all microscopic work.

Larson: Were you trying to find a natural enemy too? And develop it?

Massey: A natural control, that's right. We published on the nematode parasites of the Spruce Beetle. From 1950 until I retired, most of my work, except for the administrative work that I had to do with work in the Southwest, was with nematode parasites.

Larson: What did you find? Were you able to develop the parasite?

Massey: No. We found that is is probably one of the factors that is responsible for keeping epidemics endemic, if you understand what I mean? In other words, potential outbreaks. Nematodes are a factor in keeping them under control.

Larson: I see.

Massey: Along with entamophagus parasites.

Larson: So you have several factors, really, keeping an infestation under control. One would be temperatures, rain, the water content of the tree, correct?

Massey: The content of a tree, the tree growth. We know that in Nex Mexico the Fir Engraver Beetle was controlled by a nematode parasite. An outbreak of scolytus ventralis was controlled by nematodes.

Larson: Were you able to find anything out about the life cycle of the nematode parasites?

Massey: Oh yes. In 1955 they asked me to come down there to Albuquerque and take Jack Bongberg's place when he had gone to Washington. I told them that the only way that I would come down was if they would let me continue the nematode research because I had gotten to a spot in my research where I did not want to give it up. In other words, it would be giving up too much that we had already accomplished. It was touch and go as to whether they would let me do it. They thought that running the research down here was more important than that, and I did not think so, and I told them at that time if that was the case then I would stay in Fort Collins. Well, they decided finally that I could do both. So, it was continued from the time I came down here until my retirement in other words, I had studied nematoed parasites, altogether, for about twenty-two years.

Larson: So, your earlier education came in handy.

Massey: That's right.

Larson: It was a specialty. What factors benefit the nematode parasites?

Massey: Moisture mostly. In other words, Bark Beetles that survive in an environment that is quite humid. The Engelmann Spruce Beetle, the Black Hills Beetle at higher elevations, the Fir Beetles, are much more likely to be infected with nematodes than beetles which occur in such trees as Black Locuts, for instance, Scolytus Muticos, was one of the few insects in which I could never find a nematode. Nematodes are not nearly as prevalent in the Western Pine Beetle. While they had them, they are not nearly as prevalent as they are in the Engelmann Spruce Beetle. Nematodes travel in a film of water: in other words, a film of moisture. You know that there is a film of moisture where we think there is no moisture. The more prevalent that moisture, the more likely you are to have nematodes. In fact, I spent two months in New Zealand, and they had a nematode parasite of a Horn Tail there.

Larson: When did you spend the time in New Zealand?

Massey: In 1966.

Larson: Okay. We will get to that later.

Massey: They were quite interested in the study.

Larson: So, drought conditions, besides offering the pests, you know, there are other factors in drought conditions that give them an advantage in their growning.

Massey: That is right.

Larson: That also, then, reduced their parasites.

Massey: That's right.

Larson: So it still all comes together ecologically, doesn't it?

Massey: That's right.

Larson: Can you tell me what the objective was in your research on nematode parasites, and I think that would probably be the same as what your argument was to support your continuing to work on that research.

Massey: We were looking for...you have got to realize that it was about that time that Rachael Spring came out...

Larson: Rachael Carson?

Massey: Rachael Carson came out with Silent Spring, and we were getting static at that time from people, most ecologists, who did not appreciate the use of chemicals in control of insects over widespread areas. In other words, we had the U.S. Fish and Wildlife Service which had an office in Denver, cooperating with us on the treatment of these areas to determine if we were killing mice, or to see if we killing birds, like Woodpeckers, with our control methods. Woodpeckers are quite a natural control factor in themselves. It at all possible, biological control is the most effective way of keeping populations reduced to a point where chemical control is not necessary. Nobody had realized... oh, they had done quite a bit of work in Germany on nematodes, but nobody had done any work at all in this country on Bark Beetle parasites. They had done some work on the effect of Mermithides on Grasshoppers and...

Larson: Hadn't the Gypsy Moth people done some sort of research on that?

Massey: Hank Thompson had been working with, not the Gypsy Moth but the Japanese Beetle. They were working with a nematode that was effective and they

were planting it in the soil and trying to kill the Japanese Beetle. Then, Hank Thompson... do you know Hank Thompson?

Larson: No.

Massey: Hank Thompson is at Corvalis, working with virus diseases, was working with the nematode that infested the Japanese Beetle. They were able to rear the parasite quite successfully on artifical media, and they were trying to introduce it into epidoptcrous infestations. We tried to infect the Spruce Bud Worm here, and it had little or no effect on it. But that that is the only other work with nematodes that I know of. Nobody had worked with Bark Beetles at all. As I said, we started seeing the worms but we did not know what we were working with. We contacted people in the Department and were able to get probably the most prominent nematologists in the field who happened to be working in Salt Lake City and had worked with the Sugar Beet nematode in Utah. He was mainly a Taxonomist. I did not know one nematode from another. In other words, we had to learn the basics of Taxonomy before we knew even what we were working with. So, I spent several weeks every year for five or six years, with Jerry Thorne in Salt Lake City, and he was teaching me Taxonomy of nematodes. Now, I had said that nobody had worked with Bark Beetle nematodes, but he had written a paper on nematodes associated with the Mountain Pine Beetle in Utah. He had found one internal parasite, and so, one thing led to another. He was the grandest person that I have ever known, and he was never too busy to show you the slightest thing. I worked with Thorne for several years. I had a flair for Taxonomy anyhow, and that was the start of the Taxonomic work on Bark Beetle parasites.

Larson: So, it was largely a response to sort of a cultural change from Rachael Carson's writing?

Massey: That's right, it was a response to that. I forget when that was. Do you remember when it was?

Larson: It was the early Fifties, around '52 or '53.

Massey: That's right, and people were beginning to complain. I could never quite understand and I still don't agree with them. I think DDT was one of the finest tools that we have ever used in Bark Beetle studies. We were able to use DDT in the study of biological control agents. In other

words, we would allow the trees to be attacked, treat the tree with DDT which kept all predators and parasites out, thus determining the of these agents on Bark Beetle populations.

Larson: They would not cross that line?

Massey: They did not cross the DDT, they would not go through it. It was a very effective repellent. We would get broods that were ten times as great in trees that were treated with DDT after the Bark Beetle had attacked. That was with emulsions of DDT. As we were using emulsions so that we would not kill the beetle, or water solutions of wettable powders, which were just as effective.

Larson: What is an emulsion? Isn't that a water base?

Massey: Am emulsion has oil in it but it also has water. They had wettable powders in which DDT would be in suspension in the water itself, and not mixed with the water. We were able to get broods of the roundhead pine beetle that were ten times as great in trees that were treated with DDT as compared to trees that were not treated with DDT. In other words, the parsites and predators were taking ninety percent of the broods and we were still getting enough brood to coninue an epidemic. If it had not have been for the parasites and predators holding what we had under control, it is conceivable that we would not have any trees left. The population of the beetles themselves would be so great that nothing could stand in their way.

Larson: Taking the other point of view, except perhaps some sort of change in the environment.

Massey: Environment, that is right. But that in itself is a change in the environment when you have predators and parasites able to go ahead and infest the beetles that they normally infest.

Larson: Yes.

Massey: When, if you keep them away and protect the beetle populations from its parasites and predators, broods were tremendously higher.

Larson: Could you explain further the use of DDT and other sprays? Did you doany aerial spraying in this area?

Massey: Yes, we tried to control bark beetle infestation in the Black Hills in South Dakota with aerial sprays of DDT but it showed no effect at all.

Larson: No effect?

Massey: No effect at all, and we used benzene hexachloride at the time, too.

Larson: Do you think perhaps that is where the problem lies with the use of DDT, through aerial spraying, which is rather indiscriminate?

Massey: It is indiscriminate. I think that DDT was blamed for a lot of things though that it was not responsible for. I practically swam in DDT when it first came out. We used it extensively in trying to control the Bark Beetle populations.

Larson: When you first got it did you really understand?

Massey: We didn't understand that it was that poisonous. I still don't think it is that poisonous. Last night CBS had an article on the use of DDT and it seems that these people who wereliving in close proximity to a place where DDT was being manufactured, it was found that their body tissues were quite heavily...

Larson: Damaged?

Massey: Not damaged but contained DDT. I guess that is one of the faults of DDT.

Larson: It has a high residual affect.

Massey: That's right, a high residual factor, but they found the highest residuals of DDT in these Blacks in, I think it was, Alabama, that they found in the United States. Well, it scared the hell out of the people, by informing them of the fact, but in the same breath, they said they did not know whether DDT would have any affect on them. They had never been able to prove it. We do so much half-assed research. If DDT is poisonous, they why don't we find out how poisonous it is.

Larson: It seems that often times any discussion of DDT is laden with such emotionalism that some findings and some of the current thinking could be questioned. Would you agree that perhaps an inductive sort of logic is being used in that they have a certain conclusion and that is that DDT is harmful, and then they set out to prove that, rather than the so-called scientific method where you bring in data and then reach your conclusion?

Massey: Oh, I am quite sure that is the case. It is much the same as much of the research now that is being publicized on most chemicals, whether it be chemicals for human use of for insect control. Saccharine is a good example. What they are trying to do is transpose results of tests on animals, and supposing that the same dosage would cause cancer in humans. They do the same thing withall this propaganda against chemical control. They have fed pound after pound...I know the Department of Agriculture was feeding pound after pound of DDT to cattle. As I recall, they could not determine what the affect was on the cattle. They knew that residuals in the tissues were high, but, as I said before, they could not prove any damage to the cattle. Now, whether they have continued that research or not, I don't know. I have seen nothing published on the affect of DDT on cattle, but still,it is one of the criteria that they use in saying that DDT shouldn't be used because it is found in the milk. But, as I say, to this day they haven't proved one damn thing for or against it as far as I am concerned.

Larson: Well, there is a strong emotional feeling against DDT or any chemicals.

Massey: Any chemical. I think that one of the best commericals we see on television, for instance, are these commerical that Monsanto puts out, saying that chemicals are not all harmful; that, if it wasn't for some chemicals, our way of life would be temendously altered. For instance, if it wasn't for DDT, look at the Malaria we would have had in the areas wher Malaria is prevalent. Sleeping Sickness was practically wiped out by the use of DDT. If we would think of the thousands of lives that DDT has saved, and I mean literally saved, how can you balance one against the other? There are many people who are living today that would be dead if it weren't for DDT.

Larson: Well maybe that is a different example though. In using it to destroy insect pests, it is not directly saving lives.

Massey: In using it to destroy insect pests it is directly saving lives. In other words, when they destroyed the mosquitoes, or...

Larson: I mean forest insects.

Massey: Well, if we are talking about forest insects, but you have got to take the broad view. In other words, if they had not killed the Tsetse Fly, there

are a lot of people who would not be living today if it wasn't for DDT. Apples would be a hell of a lot cheaper today, let me say, if we were still treating the Coddling Moth with DDT rather than some of the other more expensive chemicals that they have had to develop.

Larson: So, it is directly applicable.

Massey: It is directly applicable. For instance, look at the cost of controlling the Spruce Bud Worm. Once they had banned DDT, they have had to develop other chemicals. Look at the cost of development: and DDT was probably the most effective insecticide they had for Spruce Bud Worm, if we want to get to forest insects.

Larson: Did you have any adverse affects by the use of chemical sprays, or chemical treatments in this area?

Massey: As I said, I have practically swam in DDT, and, at least at my age, I have had not ill effects.

Larson: How was that?

Massey: Well, at the time that we were using DDT, there were no precautions to use except for the cautions that would come out in labeling. I don't know how many people that have worked with chemicals in insect control that have payed a hell of a lot of attention to the safety measures that are printed on the DDT packages.

Larson: Maybe that is part of the problem.

Massey: Maybe that is part of the problem, but we certainly used no gas masks when we were spraying it.

Larson: What about the other chemical controls? Do you think that DDT was especially dangerous as compared to the others?

Massey: Well, I think that now, just recently, I have seen where they have banned, either they have banned ethelynedibromide or close relatives of it. I think the handwriting is on the wall. I don't think that we will be able to use chemcials much longer, and I think unjustly so, they are banning chemicals for much more damage than they have really done, as far as polluting the food chain.

Larson: It is still too early to tell either way.

Massey: That is right.

Larson: As an entomologist, with a sort of specialty in taxonomy, do you see yourself as an advocate of chemical use?

Massey: No, I am not for or against it.

Larson: It would seem that you would lean towards a so-called natural natural...

Massey: Three or four years before I retired, DDT was going out of the picture and the regulatory board, part of the Department of Agriculture, had seen the handwriting on the wall and they were investigating DDT and some of the other chemicals to the point where they said "we have got to get rid of it. We can't control the Spruce Bud Worm. We can't control the Tussock Moth, and some of the other defoliators, so we have got to develop other methods." Well, it was during the Johnson administration that they came out with a lot of money they were going to budget for biological control, we thought. As I recall, the proposals went to the Forest Service for what they would best like to do with their money. We at Albuquerque thought that we were sitting in a cat-bird seat. All the research work for the last several years had been mostly in the field of biological control. We thought we would get a hell of a lot of money and it would be something that we could use in the control of forest pests because we had done much of the basic research in biological control. What the hell did they do with the money? They sent most of it to Berkeley and started a project on the development of better chemical controls.

Larson: Is this the University of Berkeley or...?

Massey: No, to the project at Berkeley in conjunction with the university. We didn't get a damn cent. I think that from that time on, research started to go to hell in the Southwest, as far as forest insect research was concerned.

Larson: Well, that is a little ahead in our story, but, how much do you see the work that you did on parasites as affecting what is being done now?

Massey: Well, it has not affected it a damn bit. As I said, there is no more research, as far as I know, on nematode parasites in the United States. I wrote a handbook that compiled all the research that I had done on nematodes over twenty years and it was published as such. I forget the catalogue

number of the handbook. But, anyhow, it has descriptions and life histories and suggestions for use and suggestions for further study as far as nematodes are concerned. In other words, it was a compilation of all the work I had done and it was published by the department, and I don't think a damn thing has been done since. In fact, there is no more forest insect research in the Southwest. There is no forest pathology in the Southwest. All we have, as far as forest service research in Albuquerque now, has to do with water shed research. I am not tooting my own horn. It is a pity that this research was discontinued down here, in that it was the last place in the United States that research on forest insects was started. The research body lasted for about ten years; not quite ten years, in fact, about eight. Oh no, I am sorry, it was about fifteen years. The Southwest has probably a larger variety of trees than any other section in the United States. We have a larger variety of forest insects than any other one section in the United States. How can you possibly complete research on the myriads of problems we have, in such a short time?

Larson: Yes.

Massey: We have Walnut in the eastern part of the state, we have Mexican Pine in the southern part of the state.

Larson: You are talking about New Mexico now.

Massey: That is what I say. We have Mexican Pine in New Mexico, in the southern part of the state. We have hard woods in this state that do not grow in any other state in the west. We have Bark Beetles. We have more species of the Dendroctonus in New Mexico than in any other state in the United States.

Larson: Let's bring you more into New Mexico in your biography here.

Massey: All right.

Larson: You first came to Albuquerque in 1955, and you were here until 1972.

Massey: That's right.

Larson: We have already established that you were continuing to work on the parasites. What other type of work did you do?

Massey: In New Mexico?

Larson: In this land of myriad problems?

Massey: We determined the life history of the Roundhead Pine Beetle. We determined the life history of, what was at that time known as the Dendroctanus barberi, which turned out to be thw Western Pine Beetle. I think this fellow--I forget his name--from Brigham Young University, who is quite a taxonomist on Bark Beetles, has determined that barberi and the Western Pine Beetle are the same, which is all right. I am quite sure he is right. In fact, this goes back to nematodes again. The internal nematode parasites of Bark Beetles are quite host specific. In other words, you get a dfferent species of nematode for each specie of Bark Beetle, and the one in barberi and the one in breicomus are the same. We also worked on the Walnut Caterpiller, which is in Carlsbad on the National Monument. We published a paper on a beetle Triehgba, which is closely related to the Cucumber Beetle. It was attacking Rabbit Bush which is a pest of our range lands here, which possibly could have been used as a biological control in destroying Rabbit Bush. We did work on Ipsconfusis which is a pest of Pinyon Pine. I could go into the cause of these outbreaks if you want me to.

Larson: Yes, please do.

Massey: Ipsconfusis is a pest of Pinyon Pine. It is not a serious pest...It will attack weakened trees here and there until its population is, as we said with other Bark Beetles, builds up to where they reach out and attack trees of all size and vigor. The Forest Service in all its knowledge of all things decided that they needed more range land for the cattle to feed on, so they started a cabling project. Do you know what cabling is?

Larson: No.

Massey: They put cable between two tractor and hook the two together go through and tear up all the Pinyon and Juniper between surely if the Pinyon and Juniper gone only grass would grow.

Larson: They can make meadows.

Massey: Yes, make more meadows. The Pinyon is a beautiful tree as far as I am concerned, and here is where I become so much of an ecologist that I could belong to the Sierra Club. What the hell do they want

to wipe out the Pinyon for? They have found out, I am quite sure that the amount of grass they grew by wiping out all the Pinyon and Juniper would feed maybe one or two cows per acre, it that many. Well, immediately, they started getting big infestations around their national parks. They did it at Grand Canyon National Park, they did it at Bandeler National Park.

Larson: Do you think it is because of this?

Massey: Because of the cabling, purely and simply because of the cabling, Inpconfusis built up tremendous broods in those downed trees. The tree had no resistence.

Larson: They kept the trees there when they were cut down?

Massey: Yes, they didn't do anything. They just let the tree lie there. Your right hand didn't know what your left hand was doing. They never asked us whether it would be a good project. I don't like to sound Bitchy about it, but it was one of the biggest faults of the Forest Service, there wasn't a lot of consultation between Divisions. The range manager had no idea that something like that would happen, All they had to say was "what is this going to do? Is this going to cause insect outbreaks?" Soon, half the Pinyon on Bandeler National Monument was going. That was an integral part of the monument. They did the same thing at Grand Canyon. Soon they were fighting like hell to save the Pinyon on Grand Canyon National Park.

Larson: Isp breed in the downed trees, and slash?

Massey: That's right. Ips are notorious feeders on slash. The downed trees were nothing more than slash as far as the beetle was concerned. Well, anyhown, we did research on...

Larson: What happened in these infestations?

Massey: They just petered out finally, after they destroyed thousands and thousands of trees. We didn't have money for control, The Park Service howled like hell, and the Forest Service could care less.

Larson: And by this time, 1955, you were already part of the Forest Service?

Massey: That's right.

Larson: The Bureau of Entomology had been absored.

Massey: That's right. This happened about 1960, '65. I still say that probably, and I say this without compunction, that forest entomologists know a hell of a lot more about forest management then forest managers know about forest entomology. I say this without the slightest compunction. They still can't manage Spruce and they are trying to manage it. They don't know whether to cut it, in strips, in groups or patches, they don't know whether to selectively cut it.

Larson: It is a young science I guess yet, isn't it?

Massey: That's right, but a forester will not concede that a biologist is in the same league, really.

Larson: Well, before we go on with that--we will have to get back to that because it is a good subject--you mentioned some other projects you worked on when you were working in Albuquerque, on the Round Headed Pine Beetle, and what became known as the Western Pine Beetle, and the Walnut Caterpillars. Could you talk about those things?

Massey: Yes. Another one was Matsococeus which is a pest of Pinyon Pine; it is a soft scale. It especially did quite a bit of damage on some of our national parks.

Larson: What period was this?

Massey: We did definitive research on the life history of that. The Tent Caterpillar, we did the initial research on the control of the caterpillar on Aspens with virus diseases.

Larson: Oh really?

Massey: That's right.

Larson: Well, why don't you explain that somewhat? First, explain the outbreak itself and then the treatment.

Massey: We were getting tremendous outbreaks of the Forest Tent Caterpillar on Aspen in and around Taos and in Northern New Mexico and on the Navajo Indian Reservations. Here agin, DDT would control it.

Larson: When they web up they make what is essentially a tent, right?

Massey: Yes, that is right.

Larson: It is a very dense web that covers.

Massey: And they completely defoliate the tree.

Larson: Under the tent.

Massey: It takes several years of defoliation to kill a tree but we can show you acre after acre where they had defoliated the trees, in successive years, so that the trees did die or become infected with disease, and died as a result of the diseases. We had known about polyhedral diseases for a long time. Hank Thompson was doing a lot of work with these diseases at Bettsville in Washington. So, we thought that perhaps the virus would work on the tent caterpillar, and he knew it would work too because they had used it in some of their nurseries at Bettsville. He crushed a lot of larvae that had virus and made a solution of the virus. He would spray it on trees and he would get control. We went out and collected a lot of infected caterpillars and we were able to get a solution. It took a lot of caterpillars but when you think of the numbers of acres we sprayed with this virus solution. It was suspended in water, probably with a suspender of some kind in it, in this case it was corn syrup, and hundreds and hundreds of acres we sprayed with the solution. We had to collect the virus mainly in infected larvae. You can see the virus microscopically; it looks just like it says, a polyhedra, it is a crystalline polyhedra. Anyhow, we used it around and we used it on the Navajo Indian Reservation and by God, it was successful. Areas that we had sprayed are still free, and these areas had been completely defoliated for many years not entirely but patches here and there. I have been back there two or three times since and there still are no outbreaks. I am quite sure the virus is there and those larvae that pick it up become sick and die and they leave the polyhedra on the leaft or twig, you know, and those that eat it pick it up etc...I think it has one of the finest prospects of any biological control that we have. The same thing was happening on the Indian Reservation. The Indians were complaining quite vociferously about their springs being polluted by the damn caterpillars when they would fall off the trees. The water was becoming unpotable because of migrating larvae we went in and treated the aspen surrounding the

springs with the virus and we were able to practically eliminate the caterpillar. I won't say completely because I don't think anything is eliminated as they say, but anyhow, it kept it under control. Now they are using it also on the Tussock Moth. We also used it with beetles and thuringinsis bacillissyringeatious, I mean, mixed the two together, and it was quite effective. I forget what the hell the reason was for mixing the two. Perhaps it was for quick knock down; in other words, the bacillis would knock them down quicker.

Larson: Could you spell that for me?

Massey: Bacillis?

Larson: No, the second word,

Massey: T-H-U-R-I-N-G-E-N-S-I-S, I think it is.

Larson: Okay.

Massey: G-I-E-N-S-I-S, yes. You would have to talk to someone more knowledgable, but I think this was the reason that they would become sick quicker with Bacillis Thuringiensis, then they would with the virus. Anyhow, we found that Bacillis Thuringiensis enhanced the control of the virus. But, a funny thing happened with the virus. We had to stop using it because the Food and Drug Administration...here we have used this stuff year after year, and the pathologists from the University of California came out and said "you can't prove to us that this will not affect humans. We have to have clearance for it." Now, whether they have ever gooten clearance on other lepidopterous insects I don't know, I know that they have not getten clearance to use it on Tent Caterpillar. I know they have been using the virus on the Tussock Moth, so perhaps they have gotten clearance for the Tussock Moth virus. It is the most assinine thing that I have ever heard. It is the Food and Drug Administration.

Larson: What does it take to get clearance?

Massey: What?

Larson: What does it take to get clearance? What sort of tests would you have to...?

Massey: I really don't know what it would take to get clearance. You would have to prove to them that

it would not kill human beings. My God, as with DDT, we practically swam in the damn stuff, the solutions without any ill effects whatsoever. Hank Thompson has worked with it since I can remember and it has not harmed him. I don't know what they want.

Larson: When you use the virus, does the virus itself spread then?

Massey: It is spread by the insect.

Larson: I mean, when you introduce it artificially, does it then become established and then spread itself?

Massey: Established, that's right. It is spread by the insect itself, I mean, to my knowledge it does not blow. A caterpillar will get it and spread it to that caterpillar, it is spread with the fecal material onto the leaves, and it keeps going.

Larson: So it too, hopefully, has a beneficial residual affect?

Massey: That's right.

Larson: It stays and spreads. It sounds like a good means of control.

Massey: Yes. And then, we also worked on the Tussock Moth which was up here in the Sandias and it just popped up all of a sudden. We had never known of it in the state before. In fact, they had not known it this far east for years and years and years, and all of a sudden it appeared. It also appeard near Globe, Arizone at the same time.

Larson: But that would have already been dealt with enough to where you would get some control.

Massey: Yes.

Larson: How extensive was the...?

Massey: We controlled that incidently with DDT.

Larson: By ground spraying or...?

Massey: By aerial spraying.

Larson: What about the Brown-Headed Pine Beetle.

Massey: The Round-Headed?

Larson: Round-Headed you say?

Massey: Yes. We did the definitive study on the life history of the Round-Headed Pine Beetle. It is not as aggressive as the Mountain Pine Beetle, but it is more aggressive than the Western Pine Beetle.

Larson: How did you treat that?

Massey: In the same way we treated the Engelmann Spruce Beetle--Ethglene Dibromide.

Larson: And you were able to hold back the epidemic?

Massey: That's right.

Larson: How about the Western Pine Beetle?

Massey: The Western Pine Beetle? We have never had infestations here that we have really treated. For the most part, in New Mexico, the Western Pine Beetle can be controlled by forest management practices.

Larson: So then...?

Massey: By selective cutting and getting rid of your old trees.

Larson: So then, if good forestry is practiced, then you won't have an epidemic of the Western Pine Beetle?

Massey: That's right. The Western Pine Beetle was never a problem here like it has been in California.

Larson: Well, isn't it also very encouraged by droughts and such conditions as that? I think that was the case in California anyway.

Massey: Oh, I am quite sure it is. We had an infestation of it at Bandeler National Monument, and it was during a period when probably the water table had sunk to such a level that trees were under stress from lack of water. In New Mexico we have a special problem in that in most areas the trees are growing under stress all the time anyhow. You see what I mean?

Larson: It is very dry.

Massey: It is the exception when we have abundant rainfall, or enough rainfall, except in specific areas. The Forest Service has often used that as an excuse,

in budgeting funds for the Southwest. They would say, "well, you aren't getting trees that are commerically worth growing." The only answer that we had for them was that anything we have is worth keeping because it is all we have, and I think this is one of the reasons that they really didn't give a hell of a lot about research in the Southwest.

Larson: Again, I am saving the end for this topic.

Massey: Okay.

Larson: Several times you mentioned working on lands of national parks and national monuments. How often did you do that?

Massey: Oh, I think that the national parks was one of our biggest customers in the Southwest, if you want to call them customers; and they were customers. After all, responsibility for the administration of forest insect research in the Southwest was put in the hands of the Forest Service. The Park Service had no other alternative except to ask for help when they wanted it. They would ask for help on problems which, I am quite sure the Forest Service didn't think were problems that really needed attention, but to the Park Service they did. For instance, the Walnut Caterpiller on Carlsbad National Monument, to most people and I think to a lot of people in the Forest Service, the only thing in Carlsbad was the caves. This isn't true. They have a tremendous amount of land out there which is in the canyons where Walnut is growing. It is one of the few places in the state where Walnut does grow. They would ask for help with such things as that. The Park Service, for instance, was interested in keeping their browse plants growing. In other words, we had worked on getting rid of it but the Park Service wanted to keep it.

Larson: Well . they had a different mission.

Massey: That's right, and the Forest Service, for some reason couldn't see that this should be a problem. Well, it is a problem. If you have something that is destroying what you need, then it is a problem. These plants are all an integral part of the...

Larson: Eco system.

Massey: That's right. The Park Service isn't completely honest when they want to get rid of all their damn donkeys that they are trying to get rid of now

on the National Monument.

Larson: Well, the donkeys aren't really part of the natural system, are they?

Massey: Well, what do you consider natural? Something had to bring everything that we have here into it sometime or other.

Larson: Sure.

Massey: Everything didn't occur just naturally.

Larson: Yes, I guess that is right.

Massey: People are an integral part of the National Monument now. If we were only going to keep those things that occurred naturally in a place...

Larson: We wouldn't have sagebrush would we?

Massey: No, that's right. Many of the plants they have growing there wouldn't be there.

Larson: In the Northwest, a group was formed called the Pest Action Council whereby people from several interest groups joined to fight forest insect pests, to try and figure out how to do it, and there were people from the Bureau of Entomology, there were people from private industry, and from other governmental agencies. Was there every anything like that in this region?

Massey: Yes. I think there was an action group started by the Western Pine Association really. We had Art Upson who was a former director of the Rocky Mountain station when it was located in Tucson.

Larson: Can you spell his last name?

Massey: U-P-S_O-N. He is dead now, but he was quite active, and he gave us quite a bit of support for research work in the Southwest. We had a fellow by the name of Yale Weinstem who has something to do with one of the lumber companies in New Mexico. He was part of the whole group. All in all I think that probably we got more support from those two people than any other sector. They had considerable clout with the congressmen; both of them. Chavez, when he was here and was Senator, he got us money. Senator Hayden that was a senator for so long in Arizona, Art Upson was quite friendly with him, and he was able to get us money. They both passed on and...

Larson: Was their money directed at combating any particular problem?

Massey: Not combating it, but just for more research work for insect pests in the Southwest.

Larson: Well, that's good.

Massey: Yes.

Larson: That is very good. Did you, when you were part of the Bureau, did you generally work on forest lands wherever there happened to be an epidemic?

Massey: That's right. We cooperated with all people on all public lands and with the entire private sectors too. I think that after we left the Bureau there wasn't nearly as much cooperation between government agencies, between the Forest Service and these government agencies, as compared with the Bureau of Entomology and these government agencies.

Larson: What about the first years following 1954 when the Bureau was absorbed by the Forest Service? Did you still continue the practice that philosophy of treating forests wherever they happened to be infested?

Massey: Yes, we did, but I don't think it was done with the same cooperativeness that was done under the Bureau. In other words, when we were with the Bureau, we knew it was our responsibility to service those agencies who had forest insect problems. When we were under the Forest Service the Forest Service seemed to think that we were part of the Forest Service, and that if other agencies needed help they ought to take care of themselves, but they had no way to take care of themselves because all the entomologists had been absorbed by the Forest Service.

Larson: Before the Forest Service absorbed the Bureau of Entomology, how did you view that coming up? Did you have any notion that was going to happen?

Massey: Oh, I had qualms, and I even said, "my God, if we are absorbed by the Forest Service I was going to quit."

Larson: At what point did you see that as a possibility of happening?

Massey: Oh, perhaps for three or four years before it

happened.

Larson: And you said you would quit?

Massey: I said I would quit.

Larson: Bud you didn't (laughter).

Massey: But I didn't. Simply, I would say that I probably did not have the guts to quit. I had a family to support. I am quite sure that if I would have been a single man, I would have quit. Really, I don't think the climate for biological research--now, I am not knocking forest service research out of the Forest Service experiment station--but the climate for biological research in the Forest Service just wasn't there.

Larson: So, you see the joining of the two groups as being a negative factor?

Massey: It was a negative factor as far as I was concerned; whether other people think so, I don't know. I told them that, I told the people before it was changed that I would quit. I remember when I was quitting--that within a week or two after we had joined the Forest Service, and I think that was while Jim Beal was still at Duke before he had come back to the Forest Service, he came to me and he had a Forest Service badge someplace and he said, "here, do you want to pin this on your ass?" That was it. It had hurt me quite a bit, really.

Larson: You were working at this time with Noel Wygant right?

Massey: With Noel Wygant.

Larson: How did he perceive this?

Massey: I wouldn't like to say how he felt. I don't think he felt as strongly as I did. I don't know how he felt. He probably was of the opinion of "what the hell," because we didn't have any money anyhow so it couldn't hurt us that way. I would think that Noel would have to speak for himself on that.

Larson: I guess I would like to reword that then. Do you think that in general the feeling with the Bureau of Entomology was one of promise or one of trepidation?

Massey: I really don't like to speak for anybody but myself.

Larson: Okay.

Massey: Do you see what I mean?

Larson: Yes.

Massey: I wouldn't like to put words in other people's mouths.

Larson: Okay. That is fair enough. What did you see as the advantages that were foreseen in joining the Forest Service?

Massey: Well, I couldn't see any advantage as far as we were concerned. We were doing research and we were able to do it. I could see a hell of a lot disadvantage, and I can tell you what the disadvantages, as far as I was concerned, were. We had not been in the Forest Service over five or six years, maybe a little longer, when we first went in, Noel was put in charge and he was made an assistant director, or an assistant chief, or whatever they call them. We were able to operate quite efficiently, but he had to fight for every God damn thing that we got. I don't know whether he liked the fighting or whether he didn't. They said "forest insects is an integral part of the Forest Management, therefore we don't need an entomologist," so they put us under Timber Management. Well, we were at a complete disadvantage under Timber Management in that he had several God damn functions that the Division was responsible for and you know God damn good and well that he was going to be loyal to the functions in which he thought would be best served by his knowledge.

Larson: Yes, and his training.

Massey: By his training. As I said before, I am quite sure that most forest entomologists know a hell of a lot more about timber management than most timber management men know about forest entomology.

Larson: So you see entomology as being deemphasized then?

Massey: It was deemphasized at the Rocky Mountain station. We had a director that didn't give a damn about forest entomology.

Larson: And, did you see then a slow erosion of the...?

Massey: There was an explosing at first, as far as I am concerned. Maybe they will never read this tape to

anybody else for what I am going to say. There was an explosion of support when we first became part of the Forest Service.

Larson: How so? What do you mean, a...?

Massey: That we got money, in other words, and we got help. In 1955 when I came down here by myself, there was a fellow down here by the name of Bob Bennet who had come from Fort Collins. There were two of us running the whole shindig, and within the next five years, we had expanded to six.

Larson: So, it looked good at that point?

Massey: It looked good at that point. By the time that I had retired, there was one person left, and he left within a few years after I did, and yet we had one of the best publication records in the station.

Larson: You retired in '72?

Massey: I retired in '72, and now there is no one here. It was the last place that research was started in the United States.

Larson: So, it had the shortest span of research?

Massey: It had the shortest life history of any...they said they were going to handle it out of Fort Collins, but I don't think there has been a man over to the Southwest more than once or twice since I retired.

Larson: Well, what has happened then since...?

Massey: I don't know.

Larson: I mean, in terms of insect epidemics?

Massey: I don't know. I figured that if they wanted to forget it, that it would not do me a hell of a lot of good to...

Larson: I guess then, there hasn't been any major epidemics?

Massey: As far as I know there hasn't.

Larson: Of course, you don't know how much was because of treatment of earlier times.

Massey: That's right.

Larson: Could you tell me something about the work that you did on Indian lands?

Massey: Probably some of the best Ponderosa Pine that is growing in the Southwest is growing on the Navajo Indian Reservation. We were involved in survey work. I don't think there was any actual control work, but...

Larson: Meaning what, survey work?

Massey: In other words, they would have a few dead trees pop up and they would want to know whether they had an insipient outbreak or not. Now, this is another thing that happened which I might talk about, and which I have no complaint, is that when I first came down here, forest surveys and forest insect research were together and they were under the Rocky Mountain experiment station. In about 1960 or thereabouts, maybe a little later than that, forest insect surveys were separated from forest insect research, and put into forest administration where they were administered by the region instead of the station. But, prior to this, we ran surveys on the Indian lands to make sure that their Ponderosa Pine were in good shape and was relatively insect free, as they were quite concerned about them. Ponerosa Pine on the Navajo Indian Reservation is a big part of their livelihood. They have a tremendous mill over there and have made quite an industry out of Ponderosa Pine. I think that someday we are going to be sorry that we haven't done more research there because its the history of the Black Hills Beetle. We have it at Grand Canyon where practically all the Ponderosa Pine was wiped out at one time by the insect, and I think the same thing is going to happen both on the Cocorino Plateau and on the Indian Reservation, and on the Grand Canyon, if we don't watch out.

Larson: Why do you think that?

Massey: Because, it is just the history of the beast. The Black Hills Beetle is probably one of the most aggressive of the Dendroctoons that we have. In other words, we have have tried, and there has been considerable research work done over the years on what starts epidemics, They can find no reason for it, especially as far as the Black Hills Beetle is concerned. What brings on the infestations? We don't know. We know with the Engelmann Spruce Beetle, for instance, that most attacks are initiated by windfall or by slash that is not cleaned up.

Larson: What could be done at this point to prevent a Black Hills Beetle outbreak?

Massey: Oh, I think it is vigilance, for one thing, and I don't know that they have the manpower to handle the vigilance. I don't know if they have people who are trained that are able to determine whether an epidemic is starting. They have a pest control project in the region in the Southwest, but how well that is manned now, I don't know.

Larson: But there is yet to be major outbreak on Indian lands?

Massey: Since I have been here.

Larson: Historically?

Massey: Yes, but not so on park lands. Now Grand Canyon historically, has seen one of the worst outbreaks in the Southwest.

Larson: And they have yet to find any sort of reason for that?

Massey: Yes. I might go back too if you don't mind?

Larson: Sure.

Massey: There is another thing that we developed for control of the Spruce Beetle.

Larson: Okay, sure.

Massey: That is the trap tree control. Trap trees is where they get into an infestation--which is developing, our studies on the life history--revealed that felled trees attracted many times the number of beetles than standing trees. Say you have an area where there are a thousand trees infested. Well, we pretty well proved that you can attract the Beetles from those thousand trees into a relatively few trap trees. I think Noel can tell you more if you will remember to ask him. What they do is fall these trees in a certain pattern throughout the infested area and the beetles are attracted to them. As soon as they become full of beetles, they are removed from the forest and either treat them with ethglene dibromide or wahtever they are using now, or burn them. It is quite an efficient way of controlling them.

Larson: In a memoir recroed by Jim Evenden he mentioned briefly, he didn't explain it, he said that he was working on what they came to call the Evenden

Trap. He didn't explain but that is one thing I am going to be asking him. Do you think it was a similar method?

Massey: I don't know whether it was or not. Now, they had the Spruce Beetle up in Montana, for some damn reason the Spruce Beetles spread all over the west. They did some work on what they call logging control, but the basic work was really done at the Rocky Mountain station.

Larson: But it would actually draw the beetles out of forest?

Massey: That's right. Well, not out of the forest.

Larson: I mean, out of the trees of the forest.

Massey: Yes, into the fallen trees, and they were able to...

Larson: Which demonstrates very clearly the need to take out any fallen trees.

Massey: That's right. It demonstrates the need to watch these areas where there is heavy windfall. That is why I say the Forest Service still has not determined how they should cut Spruce so that they could get rid of windfall. I don't know the answer.

Larson: What about fire? What affect has fire had on any insects here in this region?

Massey: I don't know. I don't think fire is a problem as far as insects are concerned. What fire does to trees is it dries them up so badly that the insect doesn't really have an ideal environment to live in. I think lightning is more conducive to making a tree more susceptible to insects than fire is. In other words, it doesn't kill completely like fire.

Larson: It weakens the tree.

Massey: Lightening weakens the tree and, as a result, they become more susceptible to insect attack.

Larson: I am just asking because it appears that the trees that are left standing after a fire on the outskirts of the fire damage, the actual burned trees, are pretty susceptible to insects, and I was just wondering if you had a similar experience here. It happened in California.

Massey: Not really.

Larson: You retired in 1972. Can you tell me about your employment position and your rank, etc. at the time you retired?

Massey: When I retired I was a GS-15. I was quite proud of that. I think that for people who are doing pure research in the Forest Service, and I was probably one of only four, five or six who were in the GS-15 grade. Most of those grade positions were for postions in administration. I thought it was quite a feather in my cap that I would be able to get that high a grade for the research that I had done and for doing only research. When I retired I was doing nothing but pure research.

Larson: How were you able to reach that grade?

Massey: Mostly because I was in a position that took a special know-how, and I like to think that the work I had done was good, and evidently it was because, as I said before, there was not over half dozen who were in the GS-15 grade at time that I retired, that were doing only pure research. Perhaps since there has been. It is a grade that is equivalent to what they call a chief grade. In other words, in common nonenclature I was known as a chief nemadogist for the United States Forest Service.

Larson: So, you must have been the same in rank as many of the administrators you were working under?

Massey: That's right.

Larson: Did that cause difficulty?

Massey: No, none at all. In fact, the people I was working under had requested I be given that position. I think that really it indicated that purely scientific...and, I think that strictly speaking that the Forest Service has recognized that more and more, that people who are working purely in scientific fields should be rewarded just as much as those who are in an administrative capacity.

Larson: Yes.

Massey: I really do. They really had not recognized this until two or three years before I did retire, and I think it has gone on since then, that some of these fellows...usually it was the fifteen that were the chiefs...I can't say for sure, but I think the chief of the division, at one time, was no more than a fifteen. Not at the time that I got mine, but at sometime he had been no more than a fifteen and still had the responsibility of the whole division.

Larson: Well, you had quite a career. Are there any particular individuals who you felt played a large part in your career?

Massey: Oh yes. Jim Beal played a large part in it. Jerry Thorne who was probably one of the most able men I knew he played as big a part in my career as any other one individual. Noel Wygant played a large part in my career. By the same token, there are several people that I like to think that I played a large part in their career--people such as Frank Yuasinski who is in charge of Forest Pest Control in Washington and John Chancellor who is in a similar position in Washington. Both of them got their start in Albuquerque. There are several people who worked for me that are doing quite well in the forest service now. It is of considerable satisfaction to me that they are doing so well.

Larson: Well, on behalf of the Forest Service and the Forest History Society, and myself, I would like to thank you for your contribution to this project.

Massey: Well, I am very happy you have done it.